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CONFLICT AND AMBIGUITY
IMPLEMENTING EVOLUTIONARY ACQUISITION

Richard K. Sylvester and Joseph A. Ferrara

In October 2000, the Secretary of Defense announced that a new policy of "evolutionary acquisition" would become the preferred approach to acquiring defense systems. Implementation of the new policy has been far from automatic. Today — two years after issuance of the evolutionary acquisition policy — the Department continues to struggle to adopt a consistent approach to policy implementation, but also to achieve the kind of lasting cultural change that is critical to long-term policy success. The roots of this implementation struggle are explored, paying particular attention to the concept of policy ambiguity and how such ambiguity can drive organizational conflict. Organizational conflict is inevitable, but not necessarily counterproductive. In fact, the original policy can be improved as the organization undergoes an iterative process of interpretation, conflict, and refinement.

The Department of Defense (DoD) continues to struggle in their implementation of a new policy for "evolutionary acquisition" to acquire defense systems. The roots of this implementation struggle are explored here, paying particular attention to the concept of policy ambiguity and how such ambiguity can drive organizational conflict. The more ambiguous a policy is, the more likely it is that the various institutions charged with implementation will emphasize their particular institutional perspectives in the policy process. And when these institutional perspectives clash, organizational conflict is inevitable, but not necessarily counterproductive. In fact, the original policy can be improved as the organization undergoes an iterative process of interpretation, conflict, and refinement.

First, the history of evolutionary acquisition and its adoption as official DoD policy is reviewed, then the literature on policy implementation, focusing on ambiguity and conflict. Next, how the ambiguity of the evolutionary acquisition policy has affected the key institutions involved in implementation is explored, and how these institutions have filled in the blanks with their own judgments and conclusions about how the policy should work. We conclude by trying to determine

if the messy process of policy implementation under conditions of high ambiguity helps produce a better and stronger policy.

Policy Implementation

During the 1970s, in their search for what went wrong with President Lyndon Johnson's Great Society programs, political scientists discovered implementation. Scholars, pundits, and citizens alike were disappointed by the obvious gap between Johnson's soaring rhetoric in the mid-1960s about a "war on poverty" and the feeble results the anti-poverty programs seemed to be producing when evaluated a decade later. A new public policy approach grew up within political science to establish a connection between classical administrative theory and the new policy landscape wrought by the social and political transformations in postwar America (Kettl, 1993). The connection was implementation. Implementation was the "missing link" between policy formulation and adoption, and actual policy outcomes (Hargrove, 1975).

"No new policy is self-executing or completely self-explanatory."

Starting with Pressman and Wildavsky's study (1973) of the Economic Development Administration's work on community development in Oakland, California, the stage was set for an outpouring of books and articles focusing on policy implementation as a crucial determinant of policy success. Indeed, the literature was growing so quickly that one writer observed that the problem with implementation research was not too few explanatory variables, but too many (O'Toole, 1986). By the 1990s, the scholarly literature on implementation had ballooned to immense proportions.

In response to this scholarly "overgrowth," several researchers began attempts to synthesize the burgeoning implementation literature (Goggin, 1990). The results of this synthesis project pointed to a much smaller, much more manageable set of variables that might potentially explain the relative ease or difficulty encountered during the implementation process. Three factors in particular stood out for special attention: ambiguity, conflict, and institutional perspectives (Goggin, 1990; Matland, 1991; Pressman & Wildavsky, 1973; Sabatier, 1999). It might be argued that in this framework, ambiguity is the key factor driving the level of conflict and the variance in the perspectives that various institutions adopt.

No new policy is self-executing or completely self-explanatory. There is sure to be some degree of ambiguity about the policy and its objectives. Some will ask what the new policy means in terms of overall organizational goals. Others will point to specific cases and ask whether and how the new policy applies. The greater the degree of ambiguity — the more questions people have about the meaning and direction of a new policy — the more likely the implementation process will be a bumpy ride.

Similarly, the issuance of any new policy is sure to inspire conflict. Not everyone will agree with the new policy. Some may flatly oppose it. Others may simply be unsure of whether it is the best solution for the problem at hand.

And some will try to modify the policy's intent to meet their own institutional agendas. As with ambiguity, the greater the conflict inspired by the new policy, the more heated the political discussion becomes. And if the policy is itself highly ambiguous, or at least perceived that way by key institutional actors, then conflict is almost inevitable. Not surprisingly, this has important consequences for how smoothly implementation proceeds.

Finally, the degree of conflict and ambiguity a new policy inspires is, in part, a function of the institutional perspective one brings to bear. Is one operating within the bureaucracy, or outside, say, on a legislative staff, or with a government-contracting firm? Mile's Law is pertinent here — where one stands often does depend on where one sits.

Even the bureaucracy itself is no monolith. Within its walls are many different functional groupings — budget and financial analysts, middle managers, policy analysts, project managers, operators; the list literally goes on and on. And each of these bureaucratic divisions practices a special trade; comes out of a particular intellectual and institutional tradition; holds certain values and makes certain assumptions; and defines its mission somewhat uniquely — all of these factors help shape a particular institutional perspective, a lens through which new policies are received, understood, and, ultimately, judged. Over time, the way each organization interprets and implements the new policy creates new precedents and generates lessons learned. Thus, the process of implementation itself becomes a way of modifying and refining the original policy (Lipsky, 1980).

Policy Background

In October 2000, the Defense Acquisition Executive issued a new policy governing the systems acquisition process in the Department of Defense. This policy, contained in the DoD Directive 5000.1 and its accompanying instruction, called for the DoD to adopt "evolutionary acquisition" as its preferred approach to acquiring defense systems:

> To ensure that the Defense Acquisition System provides useful military capability to the operational user as rapidly as possible, evolutionary acquisition strategies shall be the preferred approach to satisfying operational needs. Evolutionary acquisition strategies define, develop, and produce/deploy an initial, militarily useful capability (Block I) based on proven technology, time-phased requirements, projected threat assessments, and demonstrated manufacturing capabilities, and plan for subsequent development, production, and deployment of increments beyond the initial capability over time (Blocks II, III, and beyond). (Department of Defense [DoD], Directive 5000.1, 2000, p. 4)

The DoD Instruction 5000.2 (2000) further discusses the application of evolutionary acquisition:

> Evolutionary acquisition is an approach that fields an operationally useful and supportable capability in as short a time as possible. This approach is particularly useful if

> software is a key component of the system, and the software is required for the system to achieve its intended mission. Evolutionary acquisition delivers an initial capability with the explicit intent of delivering improved or updated capability in the future. (DoD, 2000, p. v)

Recently, DoD issued streamlined interim guidance (Wolfowitz, 2002) in place of the DoD 5000 documents signed in 2001. The interim guidance will be replaced by updated DoD 5000 documents within the next 120 days. In the interim guidance, evolutionary acquisition continues as the Department's preferred acquisition strategy. However, DoD has now published a model for evolutionary acquisition (Figure 1).

Despite its recent DoD endorsement, evolutionary acquisition (EA) was by no means a new concept in the defense community. Indeed, it had been discussed and debated for many years — at least as far back as the early 1980s — prior to its ultimate adoption in October 2000 as official DoD policy.

In 1983, for example, the Armed Forces Communications and Electronics Association (AFCEA) published a study of EA that focused on its applicability to command and control systems. In 1984, the Joint Logistics Commanders (JLC), the three and four-star heads of the Services' logistics commands, formally endorsed evolutionary acquisition as a legitimate strategy and asked the Defense Systems Management College (DSMC) to produce a guide.

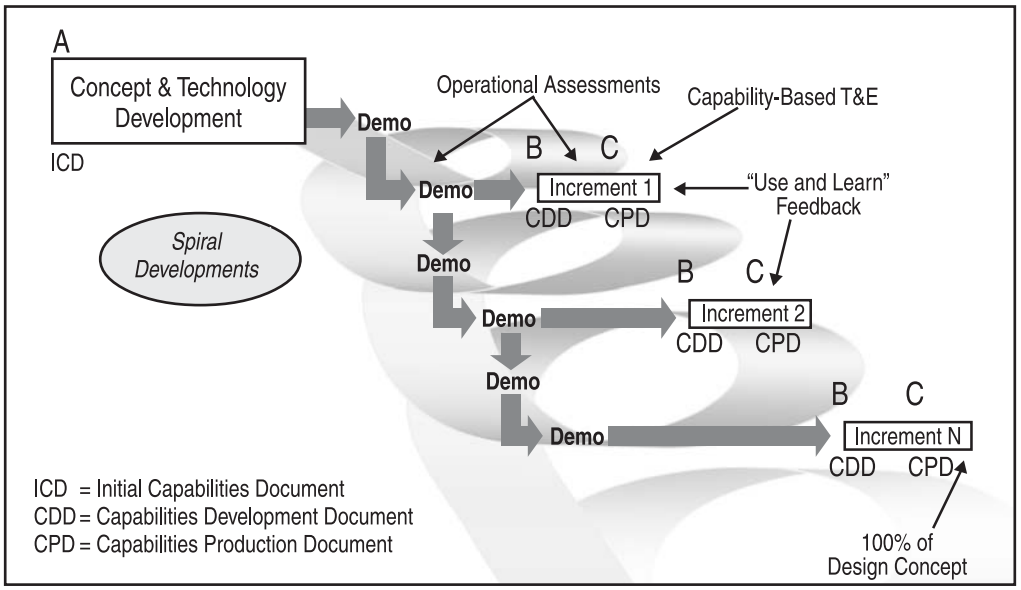

Figure 1. Evolutionary Acquisition and Spiral Development

Three years later a guide was co-published by DSMC and the JLC. The JLC guide, following the AFCEA study, focused on Command and Control (C2) systems although it stated, "while this guidance is aimed specifically at the use of an EA strategy in acquiring Command and Control systems, the principles discussed may also be applicable to the acquisition of other kinds of systems" (Joint Logistics Commanders [JLC], 1987, p. v). The JLC guide offered this general description of an EA strategy: "Considered most broadly, EA consists of first defining the general outline of an overall system, and then sequentially defining, funding, developing, testing, fielding, supporting and evaluating increments of the system" (JLC, 1987, p. v).

Also during this period, the software development community began to publish articles and research briefs advocating a form of evolutionary acquisition, most typically referred to as spiral development. Probably the single most influential article was Barry Boehm's 1988 piece in the journal *Computer* entitled "A Spiral Model of Software Development and Enhancement." Boehm sketched out a development approach whose main characteristics included concurrent engineering, risk-driven determination of process and product, early elimination of non-viable alternatives, and an evolutionary process of experimentation and elaboration that resulted in successively refined prototypes. Boehm's graphical depiction showed a line representing the development process that emanated ever outward in a series of spiral loops (hence the name "spiral" development).

Various industry associations had also endorsed the concept of evolutionary acquisition. During the 1990s, for instance, the National Center for Advanced Technology (NCAT), an industry research group affiliated with the Aerospace Industries Association, published a suggested evolutionary model and met with various DoD officials to recommend its official adoption. In a February 1996 letter to the Principal Deputy Under Secretary of Defense, NCAT specifically recommended what it called an "evolutionary defense acquisition" model:

"Also during this period, the software development community began to publish articles and research briefs advocating a form of evolutionary acquisition, most typically referred to as spiral development."

> Existing DoD-5000 phases could be replaced with a process using 3 to 5 years to develop and field systems in step with modern technology cycles. It would focus on mainstream U.S. defense needs into the next century, including precision weapons, C3I, information warfare, and technology upgrades to existing [major platforms]. The new process would be called "evolutionary defense acquisition" (EDA), stressing an intent to change today's culture with an affordable, incremental approach (National Center for Advanced Technology [NCAT], 1996, p. 3).

Even the Defense Acquisition Executive (DAE) issued guidance on the use of evolutionary strategies during this period in a memorandum published in January 1995. The DAE memorandum recognized evolutionary acquisition as a legitimate strategy and endorsed it as

an "alternative" practice to be assessed by program managers on a case-by-case basis. Here the DAE was clearly following the tenor of the prior studies and guides, many of which characterized EA as an acquisition strategy most appropriate for command and control software-intensive systems. (NCAT — in its "evolutionary defense acquisition" model, published a year after the January 1995 DAE "EA-as-an-alternative-approach" — was probably the first institution to call for the broader use of EA).

In 1998, DoD embarked on a series of high-level management improvement studies, collectively referred to as the "Section 912" studies (after section 912 of the Fiscal Year 1998 National Defense Authorization Act, which called for the studies). These studies provided the final intellectual push justifying EA as an appropriate acquisition strategy for a department contending with the twin revolutions in military and business affairs (the "RMA"[1] and "RBA,"[2] respectively).

"EA, it seemed, was the perfect strategy for meeting the challenges of RMA and the RBA."

EA, it seemed, was the perfect strategy for meeting the challenges of RMA and the RBA. The RMA emphasizes highly sophisticated defense capabilities based on the latest advances in information and communication technologies, the generational cycles of which are typically measured in months, not years. Since EA stresses an incremental approach to development, which capitalizes on the best mature technologies available at a given point in time, it matched up well with the rapid technology cycles implicit in acquiring RMA systems.

Meanwhile, the RBA highlights the need to revolutionize DoD's management systems to achieve more efficient, less costly decision and oversight processes. Again, EA appeared to match these objectives very well, since it promises an approach that would dramatically reduce cycle time and, because it relied on an intensive team-based approach to developing requirements and acquisition strategies, would reduce the costs of oversight. The Section 912 studies strongly recommended EA and then-DAE Jack Gansler enthusiastically endorsed this finding. Soon after, DoD formed a dedicated working group to revise the DoD 5000 series in line with the new EA approach.

The concept of evolutionary acquisition is not new — as we have seen, various individuals and institutions have been arguing for its adoption for at least 20 years (Figure 2). These arguments have all emphasized one key advantage to its use — the potential for dramatic reductions in cycle time (the time it takes to move from initial development of a program to actually delivering an operationally effective and suitable product to a user). In addition, its advocates have argued that EA makes sense for a technology-intensive defense environment characterized by ever more sophisticated capabilities and rapid generational cycles. It all seems clear but, as we argue below, the EA policy is fundamentally ambiguous in a few important respects.

Implementing Evolutionary Acquisition

The DoD's ongoing process of implementing an evolutionary approach to systems acquisition provides a useful

1983 – AFCEA Study of Evolutionary Acquisition (EA) for C2 Programs
1986 – Joint Logistics Commanders Endorse EA
1987 – DSMC and JLC Publish a Guide for EA Programs
1988 – Boehm Article on Spiral Development
1990 – JLC/DSMC Recommend that EA Language be Included in 5000 Regulations
1995 – DAE Issues Guidance on the Use of EA
1996 – NCAT Recommends EA as Preferred Approach to Acquisition
1999 – Section 912 Study Team Endorses EA Approach
1999 – Chairman, JCS Endorses Time-Phased Requirements
2000 – DoD Publishes New 5000 Regulations Endorsing EA as Preferred Approach

Figure 2. Evolution of a Policy Concept

case study for analyzing the role of ambiguity, conflict, and institutional perspective in policy implementation.

AMBIGUITY

A good policy is one that clearly articulates not only the desired outcomes the policy maker is seeking to achieve through the issuance of the policy but also the means by which those expected to implement the policy can make it a reality. A policy that lacks clarity in purpose and clarity in implementation creates ambiguity in the bureaucracy, and ambiguity is one thing bureaucracies try to avoid at all costs.

The evolutionary acquisition policy is one that on its face lacks clarity. DoD has long built systems in an incremental fashion. The Air Force's F-16, for example, was developed in the early 1970s and has been upgraded with block modifications over the last three decades. DoD has had a policy of pre-planned product improvement (P3I) for some time. When the DoD Instruction 5000.2 announced the new evolutionary acquisition policy, many people within DoD asked if the policy was anything new or just old wine in new bottles — a new, fancy name for an old way of doing business.

To add to this confusion, DoD leaders have used different terms when talking about EA. For example, when Pete Aldridge, the new Under Secretary of Defense for Acquisition, Technology and Logistics USD(AT&L), began discussing the use of mature technology to develop systems that meet only a portion of the requirements initially, but that would be further developed over time based on new technologies and revised user requirements, he called this process "spiral development" (harkening back to the Boehm article — indeed Boehm himself published a more recent article, in 2001, arguing that "some ambiguities in previous spiral model definitions have also led to a good number of unsuccessful projects adopting 'hazardous spiral look-alikes.'" [Boehm & Hansen, 2001]). Not surprisingly, the reaction of many observers — in DoD and in the Congress — was to ask whether there is

a difference between evolutionary acquisition and spiral development, and, if so, what the difference is and what it means.

In fact, this ambiguity was so great that the USD(AT&L) was compelled to issue a clarifying memorandum on April 12, 2002 to define the terms evolutionary acquisition, spiral development, and pre-planned product improvement:

> Since the publication of DoD Directive 5000.1 and DoD Instruction 5000.2, in which the Department established a preference for the use of evolutionary acquisition strategies relying on a spiral development process, there has been some confusion about what these terms mean and how spiral development impacts various processes such as contracting and requirements generation that interface with an evolutionary acquisition strategy… Evolutionary acquisition and spiral development are similar to pre-planned product improvement but are focused on providing the warfighter with an initial capability which may be less than the full requirement as a trade-off for earlier delivery, agility, affordability, and risk reduction. (Aldridge, 2002, p. 1)

Despite the issuance of this memorandum, questions still persist: How will evolutionary acquisition be implemented in contracts? How will evolutionary systems be supported? How will they be funded? Recently, the office of Secretary of Defense, together with industry, has formed a team to develop a Web-based continuous learning module to address the growing demands for clarity and an end to the ambiguity surrounding the EA policy.

Because EA has never been implemented in a wholesale fashion within the DoD, no one is exactly sure of how its implementation will play out, but everyone is pretty sure that full implementation of EA, as called for in the 5000 series, will probably mean major changes to the way DoD has traditionally done business. In a recent article, Alexander Slate (2002) outlines the numerous consequences of implementing an EA policy. These consequences include more upfront work being necessary; a greater role for acquirers in the requirements process and a greater role for requirers in the acquisition process; and a new approach to budgeting. Among other things, these consequences will alter established organizational relationships and such shifts almost always lead to conflict.

Conflict

One of the major issues in government (indeed, in all organizations) is who has power and who does not. The framers of the U.S. Constitution were so concerned with this issue that they devised a governmental structure that decentralized power so that it could not be concentrated in the hands of any one branch or organization. Shifts in power are a primary cause of conflict within government and particularly within the bureaucracy. New policies often have the affect of changing the power relationship because new policies add or reduce authority, or shift authority from one organization or person to another. The issuance of a new policy is often the occasion

for the recalibration of organizational relationships. The more a policy shifts power, the more conflict is engendered by that policy (particularly if the policy is itself also highly ambiguous).

When DoD made EA the preferred approach to acquisition, there was a significant change in the power relationships that heretofore had prevailed. Under the old single-step-to-full-capability model (sometimes also called the "grand design" approach) that the Department had been using over the last 30 years, the power of the acquisition community to act had been steadily decreasing. From the heyday of the Defense Research and Engineering organization in the 1970s, the power of the acquisition community to influence the course of major systems projects has been eroded by the rise of other powerful institutions within DoD.

First, and most importantly, the main hedge against the acquirers being able to develop and procure whatever they choose has been the Comptroller organization and its all-important power of the purse. The Comptroller sets rules for the release of money, and money is what fuels the engine of acquisition. Second, the Joint Requirements Oversight Council (JROC) and the requirements generation process it oversees have grown in influence and organization. The result has been a major bureaucratic entity with the power to shape acquisitions through the process of setting requirements. Finally, the establishment of the independent Director of Operational Test and Evaluation, with its authority to determine whether a system is operationally suitable and effective, has created yet another organization with the power to stop or significantly alter an acquisition.

Evolutionary acquisition changes this power balance. The process of spiral development gives the acquisition community a critical role in determining which requirements will be met when, thus creating a more collaborative relationship with the JROC. Moreover, EA also gives the acquisition community leverage against the power of the initial operational test and evaluation to determine which systems will go forward and which will stop in their tracks. Evolutionary acquisition can do this by giving the acquirers the authority to shape a system based on technology maturity and what can be produced at any given point in time, rather than what is required or what passes a test. And the more fluid and flexible process that EA envisions poses a direct challenge to the more rigid, control-oriented culture of the Comptroller community.

"When DoD made EA the preferred approach to acquisition, there was a significant change in the power relationships that heretofore had prevailed."

Conflict is inevitable in this environment of shifting power. In fact, in recent Congressional testimony, the Principal Deputy Under Secretary of Defense for Acquisition, Technology and Logistics acknowledged as much when he said, "we recognize that we have more challenges ahead, specifically…the implementation of spiral development and other techniques to shorten the weapon system development life cycle" (Wynne, 2002).

Institutional Perspectives

The Department of Defense is probably the most complicated organization

in the entire federal government. Essentially a holding company for a diverse assortment of enterprises, DoD includes four military services, three military departments, 10 functional and regional combatant commands, 15 defense agencies, and a burgeoning set of policy-making and oversight institutions, including the Office of the Secretary of Defense (OSD) and the Joint Chiefs of Staff. Each of these institutions has its history, its own values, its own defining experiences, regulations, norms, and culture. Moreover, the chain of command from the Secretary of Defense and other top DoD leaders to senior managers in these various organizations can be so complex and difficult to trace that the issuance of new policies from on high is often seen as an invitation to debate rather than an order to implement. Again, this intrinsic tendency is exacerbated when the newly issued policy is perceived as ambiguous and difficult to understand.

The ultimate success of the EA policy relies fundamentally on the actions and reactions of a few key institutions within the defense establishment. These institutions include:

- *Congress*, which through the power to pass laws and appropriate money, wields ultimate power over the DoD;
- *The military departments*, the organizations charged by law with organizing, training, and equipping the military forces;
- *The defense industry*, the major contractors on whom the military relies to develop and build new weapon systems;
- *The comptroller community*, the collection of organizations throughout DoD that play the key role in the annual development and execution of the national defense budget;
- *The requirements writers and operational users*, who represent the "pointy end of the spear" and whose judgments about urgent military needs are rarely brushed aside; and,
- *The test and evaluation community*, which, through a few key statutes, possesses significant powers to pass judgment on the suitability and effectiveness of weapon systems approaching the production stage.

In Figure 3, we examine each of these communities, focusing on how they filter the ambiguity of the EA policy through the particular lens of their institutional perspective.

Congress. The Congressional role in defense management is well established in the U.S. Constitution. Article I lays out several vital Congressional powers, including the authority to "declare war," to "raise and support Armies," to "provide and maintain a Navy," and to "make rules for the government and regulation of the land and naval forces." Congress has not been shy about exercising these various constitutional powers: DoD cannot spend money without Congressional approval. The President cannot staff the higher reaches of the Pentagon bureaucracy, from the Secretary of Defense to the Service Secretaries, without Senate confirmation. Department officials cannot initiate new start programs unless Congress approves, nor can DoD officials continue programs that Congress has refused to authorize. Fundamental changes in the personnel management system cannot be implemented without statutory changes;

Institution	Key Value(s)	Perspective on EA
Congress	Holding the bureaucracy accountable	Cautious and skeptical, though concerned about budget and requirements implications and lack of control
Military Departments	Protecting important acquisition programs	Cautiously optimistic, though concerned about implications for oversight, budget, and downstream logistics
Defense Industry	Creating value and staying profitable	Cautiously optimistic, though concerned about changes in traditional approach to production contracts and follow-on competition
Comptroller	Holding programs accountable and managing the top line	Skeptical and concerned about bow wave effects of overly flexible requirements process
Requirements/Users	Getting the best technology available and keeping the edge on all potential adversaries	Cautiously optimistic, though struggling with some disconnects between headquarters and field-level perspectives
Test and Evaluation	Ensuring operational effectiveness and suitability	Skeptical about whether EA will facilitate testing comprehensive enough to ensure operational effectiveness

Figure 3. Summing up the Institutional Perspectives

indeed, the Department must even ask for permission to conduct personnel demonstrations. This far-from-complete list of Congressional authorities over defense management illustrates the key legislative value of maintaining control over the bureaucracy.

In addition to control, Congress also emphasizes bureaucratic accountability. One way of doing so is through reporting requirements. Each year Congress demands and receives large quantities of information to assist it in conducting its oversight role. From the hundreds of reports requested during each year's authorization and appropriations processes, to the permanent statutory reports, such as the Selected Acquisition Reports on major weapon system programs, the range of reporting requirements is wide and deep. Title 10 of the U.S. Code, for example, requires over 460 recurring reports each year. This is in addition to nearly 200 recurring reports required by individual Authorization or Appropriation Acts, as well as hundreds of one-time reports.

This focus on control and accountability has certainly colored the Congressional perspective on DoD's push to implement evolutionary acquisition. Indeed, a core tenet of the evolutionary acquisition approach is flexibility, particularly in the early stages of requirements generation and initial development, and this very flexibility conflicts rather directly with Congress's historical emphasis on control.

The recent report of the Senate Armed Services Committee (SASC) illustrates this conflict:

> The committee supports the Department's effort to build more flexibility into the acquisition process and develop weapon systems in more manageable steps. At the same time, the committee believes that the Department must take a more disciplined approach to incremental acquisition and spiral development to avoid losing control over the acquisition process. (Senate Armed Services Committee [SASC], 2002, p. 334)

Here the language of the Senate committee report emphasizes "discipline" and "control," neatly illustrating the conflict that exists between the Congressional and Department perspectives on evolutionary acquisition. While the Department leadership believes that evolutionary acquisition strategies will in fact give them more control over the acquisition process, in the sense of more manageability, less risk, and more rapid cycle times, Congress appears to believe just the opposite. Evolutionary acquisition doesn't necessarily mean better outcomes; rather, it raises the specter of a loss of control and discipline.

Later, the report language also exemplifies how ambiguity is affecting the policy implementation process:

> In the committee's view, the terms "incremental acquisition" and "spiral development" are not interchangeable. Incremental acquisition is an acquisition strategy of gradually improving a capability through a planned series of block upgrades, each of which is to be acquired and fielded. Spiral development is a strategy for achieving a new capability through the phased development of fieldable prototypes. The committee understands that it may take several development "spirals" before a systems is ready for production and acquisition. (SASC, 2002, p. 335)

Clearly, Congress wants DoD to develop a common language and disciplined approaches to implementing evolutionary acquisition.

Defense Industry. The modern defense industry has its origins in World War II, during which the U.S. "arsenal of democracy" mobilized to produce thousands of aircraft, ships, and tanks for the United States and its allied partners. Although there was a period of demobilization immediately following World War II, it quickly ended with the onset of hostilities in 1950 in Korea, and from that point forward, the American defense industry essentially operated on a full wartime basis (Gansler, 1996).

The end of the Cold War, signified by the 1989 fall of the Berlin Wall and the 1991 dissolution of the former Soviet

Union, had profound and immediate consequences for the U.S. defense industry. Encouraged by the Secretary of Defense and other DoD officials, the industry embarked on an aggressive round of mergers and consolidations throughout the decade of the 1990s. At the end of this period, the industry had resolved itself into a new structure with just a few major prime contractors left standing, including Lockheed Martin, Boeing, Raytheon, and Northrop Grumman. In addition to this structural turmoil, there has been immense pressure on the defense industry to achieve higher levels of civil-military integration; that is, a greater interoperability between the military and civilian sectors of the industrial base (Perry, 1994).

Similarly, the implementation of evolutionary acquisition also poses management challenges for defense firms. The impression that the defense industry forms of evolutionary acquisition will be largely a result of how this new approach comports with key industry values and norms, specifically business risk and commercial processes. That is, does the industry see evolutionary acquisition as an approach that will decrease, or increase, business risk? And does the industry see evolutionary acquisition as an approach that will fit relatively smoothly with existing commercial processes, or as one that will require significant disruption and alteration of existing processes?

Again, the ambiguity of the EA policy and its potential consequences plays a role. On the one hand, there is strong evidence that the defense industry supports the new policy. The National Center for Advanced Technology, an industry group, was one of the first organizations to call for EA as the preferred approach to defense acquisition. In addition, several recent Defense Science Board (DSB) task forces, which included industry membership, have supported a new DoD model very similar to the EA approach. A good example is the July 1999 DSB Task Force on Acquisition Reform, whose final report endorsed a streamlined acquisition process consisting of only two major decision points ("system demonstration" and "build"). This model looks very similar to the EA model DoD adopted in 2000.

"In addition to this structural turmoil, there has been immense pressure on the defense industry to achieve higher levels of civil-military integration...."

Speaking at various defense conferences, other industry leaders have also endorsed the EA policy; in particular because of its emphasis on using mature technologies to bring the system design to fruition as quickly as possible. For example, the report, "A Blueprint for Action," published in conjunction with the 2001 American Institute for Aeronautics and Astronautics Defense Reform conference and co-authored by various industry leaders (DFI International, 2001), argues that "a critical area for reform will be the institution of new rules that provide for effective spiral development. This will require working outside the current acquisition model…a useful departure from this practice would be to field technologies that represent an '80 percent solution,' but which offer the war-fighter and the technologist alike a jumping-off point" (p. 16). In general, much of the industry support of the EA policy can be explained by the fact that

EA, at least in principle, mirrors the commercial process for bringing new products to market.

But there are significant question marks about how EA policy will be implemented, and these issues could affect industry support. A key issue, for example, is whether and how competition for follow-on EA blocks will be conducted. Historically, the firm that won the major development contract was in a very strong position to become the "sole-source" provider of the new system for years into the future. The new EA approach could potentially alter this relationship. While Firm A may win the contract to develop and build Block 1, it is not clear that this means Firm A will necessarily be the favorite to win the Block 2 work or even if there will ever be a Block 2.

"Finally, the implementation of EA may change the value proposition for defense businesses, which have traditionally relied on high-quantity production runs as a key source of profitability."

Similarly, EA's emphasis on more up-front work and more scanning of potential alternatives, including commercial and non-developmental items, could also mean more competition in the defense field — a result that no doubt promises real benefits for the taxpayer but shakes up the status quo for established defense contractors.

Finally, the implementation of EA may change the value proposition for defense businesses, which have traditionally relied on high-quantity production runs as a key source of profitability. Rather than building toward such production runs after a lengthy development cycle, EA approaches may more likely be characterized by a series of lower-rate production runs of different increments.

The Military Departments. Interservice rivalry is a staple of the defense management literature (Halperin, 1974; Wilson, 2001), but it would be wrong to conclude that the military departments do not share common bureaucratic goals. Indeed, two key objectives that all three military departments share are, first, a strong desire to get their premier acquisition programs funded, and, second, an equally strong desire not to be micromanaged by higher headquarters, in particular the OSD staff.

In this context, the potential consequences of the new EA policy are ambiguous. For one thing, just as defense firms have traditionally relied on high-quantity production runs for profits, the military departments have relied on grand-design development efforts (and the subsequent production runs) to ensure significant budget share over long periods of time. And EA strategies, with their succession of incremental designs and deliveries, may necessitate more oversight, not less. These consequences pose significant challenges for the traditional norms and objectives of the military departments. Indeed, as OSD began to develop the EA policy in 1999 and 2000, the initial reaction of the military departments was skeptical. In particular, the Army and Air Force acquisition executives then Paul Hoeper and Larry Delaney, respectively questioned the utility of the new policy, wondering if it represented, as Secretary Hoeper put it, "a bridge too far."[3]

They had various questions about the new policy — Would the investment required up front for technology scanning,

prototyping, market research, and concept development squander precious resources that would be needed later to actually build the program? How could the military departments be assured that the funding necessary for Blocks 2, 3, and beyond would actually be available when needed? And if it were not available, wouldn't that mean that the military departments would end up delivering less-than-full capability to the user, and wouldn't that damage their credibility as the institutions charged by law to "organize, train, and equip" the fighting forces?

As the EA policy has been officially adopted and a new administration has come into office, some of this skepticism has melted away. Today, all three military departments have endorsed the concept of evolutionary acquisition and are adapting it to their own cultures. The Air Force acquisition executive, for example, in interim guidance to the Air Force acquisition community (Sambur, 2002) states unequivocally that EA is the preferred acquisition *strategy* for achieving the "commander's intent" and that spiral development is the preferred *process* to execute the EA strategy. In part, this support for EA may stem from a realization that, rather than threatening all-important budget share, EA policy may preserve it as the Services pursue numerous demonstrations and development efforts to meet emerging warfighter needs. And, while it may in fact result in more oversight, EA may also mean fewer opportunities to fail because it avoids the all-or-nothing mentality of the grand-design approach.

The Comptroller Community. One of the most powerful institutions in the defense establishment is the Comptroller. Starting at the top with the DoD's Chief Financial Officer (CFO) and his staff of budget analysts and moving down through the budget offices of the military departments and defense agencies, the comptroller community has at its disposal a wide range of tools that give it enormous influence in the acquisition process. The comptroller can withhold money from acquisition budgets and write Program Budget Decisions that zero out programmed funding for one or more fiscal years. And it is the comptroller community, under the direction of the CFO, that manages the annual process of reconciling the myriad puts and takes of the Program Objective Memorandum (POM) and Budget Estimate Submission (BES) cycles to produce the defense portion of the President's Budget.

"A program is well-managed if every dollar can be accounted for and linked, often in excruciating detail, to specific project line items and program elements."

Not surprisingly, given its chief role in managing budgets and finances, the comptroller community values control and accountability (Popovich, 1998). A program is well-managed if every dollar can be accounted for and linked, often in excruciating detail, to specific project line items and program elements. Conversely, free-floating "innovation funds" or "technology investments" tend to be viewed quite negatively. In this way, the comptroller community is close cousin to the Congressional appropriators. Indeed, in many ways the DoD Comptroller has historically maintained a very close relationship

with the House and Senate appropriators.

So far, the comptroller community's reaction to the EA policy has been skeptical. A major point of contention has been how to handle the transition between successive EA blocks — When does it make sense to program funds for research and development of Block 2? How will the Department ensure that the military departments will not "game" the budget process, essentially using Block 1 as a means to get an ill-defined program into the budget and thus build crucial political momentum that will be difficult if not impossible to overcome should a decision be made that the program should be cancelled. How will budgeting work at the beginning of the EA process, when a series of activities are all ongoing simultaneously — technology scanning, market research, development of alternative concepts — even though a real program has yet to be established? How will programs be "fully funded" and when if requirements are not known at program initiation and each block of capability is independently priced? Will this create a "bow wave" that will cause more instability in outyear funding?

"The EA approach emphasizes flexibility, encourages incremental strategies, and recognizes that the user may not even know what is really required."

The EA approach emphasizes flexibility, encourages incremental strategies, and recognizes that the user may not even know what is really required. All of this poses severe challenges to traditional comptroller norms and values.

The Requirements Community. Historically, the starting point for the acquisition of any new item or service has been the mission need statement followed by the definition of operational requirements (Locher, 1985; Shalikashvili, 2000). The traditional approach to the development of operational requirements has been to establish a long-range planning time frame; request that the intelligence community project the likely threats in that time frame; and analyze the relevant research effort underway in the science and technology base of both government and industry labs and engineering organizations. These analyses result in the establishment of detailed performance characteristics for a new system. In turn, the "requirements" are turned over to the acquisition community, which establishes a budget and then selects a contractor to achieve the requirements within the budget levels. The user community monitors progress toward achieving the set requirements — which are rarely changed once established.

Because the requirements process has tended to focus on achieving very ambitious technical objectives, DoD program managers have often found themselves developing systems while simultaneously having to develop the technologies that will make the systems work. The F-22, for example, was heavily dependent on fly-by-wire technology, which, at the time the system began its development, was not mature. The inevitable result has been lengthy development cycles.

In response to the 1999 Section 912 reports, the Joint Staff issued a new Chairman's Instruction (CJCS Instruction 3170.01) that adopted evolutionary, or "time-phased," requirements as standard practice for developing and writing

operational requirements. While the Joint Staff recognized the need for time-phased requirements to support evolutionary acquisition, there remains a great deal of ambiguity with regard to actual application of the Joint Staff direction.

One of the most serious concerns is determining the priority of what needs to be done first and allowing those requirements that cannot be done first (either because the technologies to support them are not mature or because the funding to support them is not available) to be moved to subsequent increments of capability. These decisions are made, not at the Joint Staff level, but at lower levels where military department officials actually write the Operational Requirements Documents (ORDs). Based on the few time-phased ORDs that have been written since the issuance of the EA policy, there is some evidence to suggest that requirements writers are hedging their bets by front-loading capabilities into the initial system increments. For example, the recent Comanche ORD was revised to include three blocks of capability. However, the first block will include up to 90 percent of the system requirements — more if there is no second block.

This front-loading can potentially result in conflict with the acquisition community, where expectations might be that the initial increment will be more in the neighborhood of a 50 percent solution than a 90 percent solution. As one observer recently argued, "users fear that support for programs will dry up before they get a lot of the capabilities they need" (Slate, 2002, p. 9). This fear drives front-loaded requirements documents, even though this runs counter to the new Joint Staff policy.

Thus, while there is general agreement at the top of the requirements generation system that evolutionary acquisition based on time-phased requirements makes sense, there is much that needs to be done at the implementation level of requirements generation system to actually provide requirements to the acquisition community that would make these intentions a reality.

Operational Test and Evaluation. The Director of Operational Test and Evaluation (DOT&E) oversees test and evaluation in DoD. The DOT&E organization, itself a creation of Congress, is guided by a series of statutes that require certain types of tests (e.g., live fire tests) to be conducted on certain types of systems (e.g., major programs) at certain points in the acquisition process (e.g., before proceeding beyond low-rate production). DoD program offices develop test and evaluation master plans to guide the overall testing process. The DOT&E determines the systems to be tested, how many items can be procured for testing, the requirements to be tested against, and whether or not the system is survivable, lethal, effective, and suitable (although all these judgments are subject to debate and reclama within the Department). This test and evaluation structure has been established to ensure that systems are not deployed before the Department knows how well they work.

"This test and evaluation structure has been established to ensure that systems are not deployed before the Department knows how well they work."

Evolutionary acquisition changes how systems are produced and, therefore,

how they need to be tested. The testing regime is based on the idea of a grand design in which a single system will be produced, initially at a low rate, and then subject to comprehensive testing before being permitted to move to full rate production. As the Department has moved to evolutionary acquisition, the role of operational test and evaluation has become more ambiguous. Evolutionary acquisition provides multiple increments of capability, each to be deployed over time. While the need to determine if the system works still exists for each increment, the cost and time to conduct dedicated operational tests on each increment and what to test with each increment is open to discussion. For example, alternative approaches might include early operational assessments based on limited fieldings, or more simulations.

"In sum, DoD continues to deal with the ambiguity of applying a statutory operational test and evaluation regime enacted for a grand-design acquisition system to a new system that emphasizes evolutionary acquisition."

This ambiguity creates conflicts, not only with the testing statutes, but also with how the operational test and evaluation community sees its role in acquisition. Then-Director of Operational Test and Evaluation Philip Coyle (2000) argued that "how evolutionary requirements are set is very important…if those requirements have not been set thoughtfully, you can have a situation where the bar has been set too high, too early, or conversely, where the bar has been set so low that user has little interest in fielding the earlier blocks" (p. 3). Coyle's advice to program managers is to "get with the testers and the users early — very early — before the sequence of requirements for each block have been locked in." At the same time, the military departments want to limit the amount of operational testing and rely more on operational assessments of each increment of capability. For example, some have argued that full operational test and evaluation should be limited to the final increment in an evolutionary program.

While the operational test and evaluation community appears to be open to rethinking the application of test given the new EA environment, there still exists a bias toward full testing of each block. For example, in recent draft language submitted for the test and evaluation section of the 5000 policy documents,[4] DOT&E argues that "all test programs must conduct developmental test and evaluation, live fire test and evaluation, and operational test and evaluation of each new block capability, and ensure adequate OT&E prior to the release of each successive block to the user."

In sum, DoD continues to deal with the ambiguity of applying a statutory operational test and evaluation regime enacted for a grand-design acquisition system to a new system that emphasizes evolutionary acquisition. In addition, the test and acquisition communities continue to work on ways to decrease the inherent conflict between a flexible development program and a disciplined test program.

CONCLUSIONS

In 1959, Charles Lindblom published an article entitled, "The Science of Muddling Through," in which he distinguished

two methods of policy formulation and implementation. The first method, the "rational-comprehensive" approach, stresses empirical analyses of numerous alternative policies in which the ends are isolated and then the means to attain them are evaluated. The test of a good policy is that "it can be shown to be the most appropriate means to the desired ends."

The second method, which Lindblom called "successive limited comparisons," closely intertwines the processes of selecting goals and conducting analyses. Analysis is not comprehensive but targeted. In this approach, the test of a good policy is "typically that various analysts find themselves agreeing on a policy (without their agreement that it is the most appropriate means to an agreed 'objective.'" The process of successive limited comparisons, or "muddling through," allows policy makers to deal with very complex organizational and process problems by blending rationality and realism.

In many ways, the science of muddling through describes the formulation and implementation of evolutionary acquisition policy in DoD. We began this article by observing that the more ambiguous a policy is, the more likely it is that the various organizations charged with implementation will emphasize their particular institutional perspectives in the policy process. And when these institutional perspectives clash, organizational conflict is inevitable, but not necessarily counterproductive.

When DoD's acquisition leaders decided in 1999 to institutionalize evolutionary acquisition in the 5000 policy documents, they were promoting a development approach that had a long intellectual history, although not much practical implementation experience outside of the software development community. They were also facing near-universal opinion — within the Department, in the defense industry, and in Congress — that defense acquisition programs cost too much and take too long to deliver. Thus there was strong consensus about a desired end state — delivering systems faster and at less cost — but not nearly as much agreement about how to achieve this vision.

"In many ways, the science of muddling through describes the formulation and implementation of evolutionary acquisition policy in DoD."

In this environment, the concept of evolutionary acquisition was nonetheless an attractive alternative to the traditional "grand-design" approach. The old approach had equipped the United States with the most advanced military systems in the world but at very high costs and often only after substantial schedule delays. The new EA approach promised a way for DoD policymakers to ease the acquisition community into new ways of doing business.

There were two major compromises necessary for DoD to move from the old acquisition approach to a new one. The first compromise was one made by the leadership and that, as we have just seen, was to make EA preferred but not mandatory. While everyone did not agree that evolutionary acquisition was necessarily the best strategy for all acquisition systems, it was possible to find some consensus around the notion that EA should at least be the preferred approach. And the new 5000 policy documents

couched the institutionalization of EA in just this way — "preferred" but not required in all cases.

But all participants in the acquisition process, in effect, agreed to the second compromise. This compromise was to proceed with implementation, even though there was scant experience with implementing EA for major system developments. This is policy-making through Lindblom's successive limited comparisons — muddling through under conditions of high ambiguity. Under these conditions, the major players in the acquisition process have reacted to the new EA policy in different ways. And these reactions have forced changes and accommodations in the implementation process.

"In addition, DoD has worked out a process for implementing an evolutionary development strategy that has won the endorsement of Congress."

The first such accommodation has been to recognize that basic terms need clarification. As a result of the direction from Congress, DoD has adopted standard terminology for both evolutionary acquisition and spiral development that has been accepted by the military departments. Evolutionary acquisition is "an acquisition strategy that defines, develops, produces or acquires, and fields an initial hardware or software increment of operationally useful capability." Spiral development is "an iterative process for developing a defined set of capabilities." A related accommodation has been to recognize that well-known and long-used program strategies, such as pre-planned product improvement and block upgrades, are themselves forms of evolutionary acquisition.

Another adaptation to the new policy has been the revision of the Financial Management Regulations to realign the Research and Development budget categories. The Comptroller has recognized that the current budget categories do not appropriately align funding with evolutionary acquisition work efforts. So, Comptroller has redefined budget categories for advanced development (so-called 6.3a and 6.3b funding) to allow for work to be done without an operational requirements document, as described in the DoD Instruction 5000.2 as part of the technology development phase of evolutionary acquisition.

A third key accommodation is the use of early operational assessments — rather than full-up operational testing — to evaluate emerging increments of capability. For the Unmanned Combat Aerial Vehicle program, the Director, Operational Test and Evaluation agreed to allow operational assessments, in lieu of full-up testing, to be done on several blocks, rather than insist on conduction of independent operational test and evaluation on each block. Further, the Director has agreed that test and evaluation of an evolutionary acquisition program will be a combination of operational assessments in the technology development phase and tests in the development phase — but tests of the changes from the last increment, not full-up tests of each block.

The requirements process has also been modified. The Joint Staff is rewriting CJCS Instruction 3170 to recognize a better integration of the requirements and acquisition processes beginning with

Policy Document	EA Concept	EA Definitions	EA Diagram	EA Details Description	EA Functional Description
DoD 5000 October '00	Yes	No	No	No	No
USD(AT&L) Memo April '02	Refined	Yes	Yes	No	No
Interim Guidance October '02	Refined	Refined	Refined	Yes	No
EA Continuous Learning Module (in work)	Refined	Refined	Refined	Refined	Yes

Figure 4. Refinement of the Evolutionary Acquisition Policy

mission area analysis (a process formerly reserved exclusively for the Joint Staff and its Military Department counterparts). At every step in the process, the Joint Staff plans to work with their acquisition counterparts to allow for a better understanding of how to jointly develop time-phased requirements. Further, the Joint Staff is moving away from the use of ORDs for program initiation, recognizing that evolutionary acquisition requires more flexibility in requirements definition. So, the Joint Staff recognizes the need for a system concept document to guide the entire program and an Initial Requirements Document for each block of capability. An ORD will not be produced until a block of capability is ready for production.

In addition, DoD has worked out a process for implementing an evolutionary development strategy that has won the endorsement of Congress. Congress has explicitly endorsed the idea of flexibility prior to Milestone B and discipline after Milestone B —a hallmark of evolutionary acquisition — in the National Defense Authorization Act for Fiscal Year 2003 with language that endorses spiral development and evolutionary acquisition.

In each case, the need to reduce ambiguity and resolve institutional conflicts has pushed DoD's leadership to add richness to the process and to define how various functional disciplines (such as contracting, systems engineering, and sustainment) operate within an evolutionary acquisition strategy. Figure 4 shows a history of the refinements that have been made in the policy. Undoubtedly, the implementation process will give rise to new accommodations and course corrections as DoD continues to muddle through the new environment of evolutionary acquisition.

ENDNOTES

1. RMA is the "Revolution in Military Affairs." According to the 1999 Secretary of Defense Annual Report to the President and to Congress (page 122), an RMA "occurs when nation's military seizes an opportunity to transform its strategy, military doctrine, training, education, organization, equipment, operations, and tactics to achieve decisive military results in fundamentally new ways."

2. RBA is the "Revolution in Business Affairs." The RBA is a term coined by DoD business and management professionals, and sometimes used in official documents, to refer to the achievement of efficient business practices that create an environment for DoD to acquire goods and services better, faster, and cheaper.

3. The quote "a bridge too far" comes from a policy review meeting (held during 2000) at which the authors were present.

4. Comments submitted by Thomas Carter on draft DoD Instruction 5000.2, September 2002.

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